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UNITED STATES PATENT APPLICATION

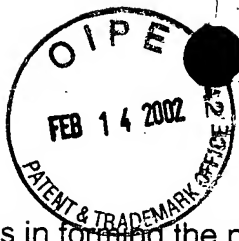
OF

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FOR

METHOD AND APPARATUS FOR CALIPER CONTROL OF A FIBROUS WEB

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steps in forming the paper web. Some examples of such techniques are disclosed in U.S. Patent Nos. 5,048,589 to Cook, et al., 5,399,412 to Sudall, et al., 5,129,988 to Farrington, Jr. and 5,494,554 to Edwards, et al., which are incorporated herein by reference.

5 According to an aspect of the invention, a method for increasing caliper control of a cellulosic fiber-containing web as the web is wound onto a roll is disclosed. The method includes the step of winding a fibrous web onto a roll to form a wound product. Prior to begin wound, the web is conveyed through a nip. The nip is configured to apply a pressure to the web and to selectively decrease the caliper of the web by increasing the pressure. Specifically, the nip pressure is increased as the diameter of the wound product increases in order to compensate for the caliper reduction that occurs in the web near the center of the wound roll due to compressive forces that are excited on the web as the diameter of the roll increases.

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5 In one aspect of the invention, the pressure may be applied manually via a *set of* calender rolls in which the calendar ^{rolls} ^{are} incrementally moved toward the web as the parent roll is formed. For instance, ~~a mechanical arm attached to the~~ calendar roll ^{may} be controlled by a human operator to move the calendar roll toward the web. *This control could be accomplished in various ways; i.e., pneumatic and hydraulic cylinders, block and tackle weights, embossing wedges, etc.*
20 Alternatively, an open loop control of the nip pressure may be employed in which, for example, a mathematical computer algorithm automatically increases the pressure as functions of time, reel length, or roll diameter. More specifically,

the algorithm can be programmed to automatically adjust the nip pressure over time, or with the use of, e.g., a flow meter, a length of passing web, or when a desired diameter is physically reached. ~~The diameter, for instance, may be realized by the open-loop system when a contact sensor is contacted by a surface of the parent roll when the desired diameter is reached.~~

Another exemplary embodiment may incorporate an on-line caliper sensor to allow a closed-loop feedback control of web caliper. This aspect of the invention may be dependent on the building diameter of the parent roll, which may be determined by the steps of monitoring the caliper of the fibrous web with a sensing device and then adjusting the pressure based on measurements of the caliper from the sensing device. Optionally, the sensing device can be supplemented by a computer to automatically adjust the calender gap or nip pressure in precise micro-adjustments as a function of the building roll diameter D. Alternatively stated, a remote computer can be configured to send commands to adjust the calender roll in small increments toward the web as the diameter of the parent roll increases.

According to another aspect of the invention, nip pressure to a tissue may occur in a converting line as the tissue is being unwound from the parent roll and wound onto a secondary roll or onto a packaging roll. The method may comprise the steps of monitoring the caliper of the tissue with a sensor and controlling the pressure of, for instance, a calendering device, based on measurements of the

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Philip S. Lin, et al.)
 Serial No.: 10/029129)
 Filed: December 20, 2001)
 Confirmation No.: Unknown)
 Title: Method and Apparatus for Caliper Control of a)
 Fibrous Web)

Group Art Unit: Unknown
 Examiner: Unknown
 Our Account No.: 04-1403

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 PATENT & TRADEMARK OFFICE

Commissioner for Patents
 U.S. Patent and Trademark Office
 Washington, DC 20231

PRELIMINARY AMENDMENT

This is a response/amendment/letter in the above-identified application and includes herewith attachment of same date and subject which is incorporated hereinto by reference and the signature below is to be treated as the signature to the attachment in absence of a signature thereto.

Fee requirements (if any) have been calculated as shown below:

	Claims remaining after amendment	Highest number previously paid for	Present Extra	Additional Fee
Total Effective Claims	45	0	=	x \$18 = \$
Independent Claims	4	0	=	x \$84 = \$
If amendment enters <u>proper</u> multiple dependent claim(s) into this application for <u>first</u> time, add \$270.00 (per application) \$				
Since Official Action set an <u>original</u> due date of _____, PETITION is hereby made for an extension to cover the date this response is filed for which the requisite fee is enclosed (1 month \$110; 2 months \$400; 3 months \$920; 4 months \$1440) \$				
If Terminal Disclaimer enclosed, add Rule 20(d) Official Fee (\$110.00) \$				
SUBTOTAL:				\$
If "small entity" verified statement filed [] previously, \$				
[] herewith, enter one-half (1/2) of subtotal and <u>subtract</u> - \$				
TOTAL:				\$
Other: \$				
TOTAL FEE ENCLOSED:				\$ 0.00

The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any fees in addition to the fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (deficiency only) now or hereafter relative to this application and the resulting official document under Rule 20, or credit any overpayment, to our Account No. shown in the heading hereof for which purpose a duplicate copy of this sheet is attached. This statement does not authorize charge of the issue fee in this case.

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I hereby certify that this correspondence and any referenced attachment and fee are being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, U.S. Patent and Trademark Office, Washington, DC 20231, on February 1, 2002

Tonya B. Gramann
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